BULLETIN OF
THE GEORGIA ACADEMY OF SCIENCE

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PROGRAM NUMBER

THIRTY-THIRD ANNUAL MEETING

OF

THE GEORGIA ACADEMY OF SCIENCE

GEORGIA INSTITUTE OF TECHNOLOGY

Atlanta, Georgia

April 27, 28, 1956

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Local Arrangements Chairman — T. W. Kethley
Georgia Institute of Technology
Georgia Junior Academy of Science Meeting and Science Fair
OGLETHORPE UNIVERSITY—APRIL 19-21, 1956

BRING THIS PROGRAM WITH YOU TO THE MEETING

W. B. Redmond, *Editor*
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Florene M. Young

THE BULLETIN of the GEORGIA ACADEMY OF SCIENCE is published four times each year, in January, April, June and September and is sent without charge to all members of the Academy.

Articles to be published in the Bulletin should be sent to the Editor, Box 534, Emory University, Georgia. Reprints of articles can be furnished when ordered before publication.

PROGRAM

FRIDAY, APRIL 27, 1956

Morning

8:30-12:00	Registration; Reservations for Annual Dinner and Engineering Experiment Station Tour. Basement Lobby, Price Gilbert Library.
9:00-11:30	Section Meetings, Presentation of Papers.
11:30-12:00	Section Business Meetings.
12:00- 1:00	Luncheon, Georgia Tech Dining Hall, or where you will.

Afternoon

1:15- 2:30	General Business Meeting of the Academy. Remarks by President. Wilby Room, Price Gilbert Library.
2:30- 5:00	Section Meetings, Presentation of Papers.
4:00	Guided tour of Engineering Experiment Station (Research Building), including Computer Center. Tour requires approximately one hour.

Evening

6:15	Annual Dinner of Academy (Joint meeting with Georgia Section of American Chemical Society), followed by Annual Address. Georgia Tech Dining Hall (T-Room). $2.06.
7:30	Annual Address: "Chemistry of Fluorine and Fluorocarbons," W. T. Miller, Professor of Chemistry, Cornell University.

SATURDAY, APRIL 28, 1956

Morning

9:00-12:00	Section Meetings, Presentation of Papers.

SECTION I

BIOLOGY

FRIDAY, APRIL 27, 1956, 9:00 A.M.
WILBY ROOM, PRICE GILBERT LIBRARY
Netta E. Gray, Presiding

The Effect of Relative Humidity on the Survival of Airborne Bacteria

E. L. FINCHER, W. B. COWN, and T. W. KETHLEY, Engineering Experiment Station, Georgia Institute of Technology.

The effect of relative humidity on the survival of airborne bacteria has been found to be two-fold. When airborne bacteria are transferred rapidly from a high humidity to a lower relative humidity, there is an immediate effect; the lower the relative humidity to which the bacteria are transferred, the greater the survival. This is presumed to be caused by the rate of drying of the airborne organisms; the more rapid the drying, the less deterimental is this effect. After the airborne bacteria have equilibrated to the conditions of lower relative humidity, a second effect has been observed. Here the low relative humidities are less favorable to further survival than are the high relative humidities.

10 Minutes 3¼ x 4 Slides

The Relation Between the Bactericidal Power of Chemicals in Air and in Water

T. W. KETHLEY, E. L. FINCHER, W. B. COWN, Engineering Experiment Station, Georgia Institute of Technology.

Equations have been developed to show the relationship between bactericidal power in water and in the air, starting with the assumption that an equal concentration of a toxic chemical in water and in the airborne bacterial particle will result in an equal rate of kill. It was found that the concentration of a toxic compound achieved in the airborne bacterial particle was determined by the nature of the chemical, the relative humidity of the air, the composition of the bacterial particle, and the fractional aerial saturation of the germicide. Illustrative data are presented for various classes of compounds.

10 Minutes 3¼ x 4 Slides

Studies on Experimental Bacterial Aerosols

W. B. COWN, E. L. FINCHER, and T. W. KETHLEY, Engineering Experiment Station, Georgia Institute of Technology.

It was found that the airborne bacterial particles atomized from broth suspensions actually consisted of one or more organisms, surrounded by a relatively thick layer of broth solids. This layer of solids actually makes up the immediate environment of the airborne bacteria and assumes primary importance in determining the survival of the organism under various conditions.

10 Minutes 3¼ x 4 Slides

The Bactericidal Effects of Ozone at 1° C

R. H. FETNER and R. S. INGOLS, Georgia Institute of Technology

The biological effects of ozone solutions were tested against *E. coli* suspensions at pH. 6.8 and at a temperature of 1° C ± 0.5. The lethal dose of ozone was found to be that quantity of ozone necessary to produce a detectable oxidizing residual in solution. It was determined that the dose of ozone necessary to

effect a kill is a very critical value and that at the lethal dose a contact time greater than one minute is not necessary. By comparison, chlorine under the same conditions gave a typically logistic-type of survival curve over a range of chlorine concentrations.

Oxidation reduction potentials (OR) of buffered bacterial suspensions were determined after the addition of successive aliquots of ozone and chlorine. There was a sharp break in the OR potential at an ozone concentration comparable to that level found to represent the lethal dose in the dosage-contact time experiments. Chlorine failed to demonstrate such a response.

The data are interpreted as additional evidence of the different bactericidal mechanisms of the two agents.

15 Minutes 3¼ x 4 Slides

Some Diphtheroid Bacteria in Aseptically Drawn Milk. A Progress Report

FREDERICK W. BENNETT, Dairy Department, University of Georgia

Fifty cultures of diphtheroid bacteria were isolated from aseptically drawn milk. Blood serum tellurite agar was the best medium which has been found for isolation.

Unautoclaved milk or unautoclaved blood serum appeared to be essential ingredients in media for satisfactory growth. Very little, if any, growth occurred in the following autoclaved media: litmus milk, serum or blood agars, tomato juice agar, or synthetic media designed for *Corynebacterium diphtheriae*.

All of the cultures isolated were catalase positive and coagulase negative. The majority were gelatinase negative, did not reduce nitrates to nitrites, were mildly lipolytic, non-proteolytic, non-pigment producers, produced acid from dextrose, galactose, lactose, levulose, maltose and trehalose; did not produce acid from *l*-arabinose, cellobiose, mannitol, *d*-mannose, raffinose, sucrose or xylose; and did not survive 61.7° C for 30 minutes. Preliminary tests indicated varying degrees of toxicity on the rabbit skin test.

10 Minutes 2 x 2 Slides

Rabbit Skin Tests on Fifty Serophilic Strains of Corynebacteria

FREDERICK W. BENNETT and JOHN W. FOSTER, Dairy Department and Department of Veterinary Hygiene, University of Georgia

The standard rabbit skin test for toxicity of *Corynebacterium diphtheriae* was applied to fifty strains of serophilic corynebacteria isolated from aseptically drawn raw milk. The majority of the strains were toxic to some degree. The toxicity of some strains was counteracted to some extent by the administration of diphtheria antitoxin, that of another group was intensified, and the antitoxin was ineffective against the toxins of a third group.

10 Minutes

The Carbohydrate Metabolism of *Paramecium* as Influenced by Insulin

BILLY E. FRYE, Department of Biology, Emory University
(Introduced by W. D. BURBANCK)

Shortly after the first quarter of this century a series of papers appeared reporting insulin to stimulate an increased sugar consumption by *Paramecium*. The present work was undertaken as an investigation of the mechanism of this effect of insulin, to determine whether the effect is one of increased sugar oxidation by *Paramecium* or one of increased storage of carbohydrate. The results of experiments on the effect of protamine zinc insulin in concentrations of from 0.1 to 4.0 units per cc. on oxygen consumption and division rate in *P. aurelia* indicate the first hypothesis to be incorrect, there being no observed influence of insulin on these processes. On the other hand, limited

histochemical studies using the Bauer-Feulgen method for glycogen suggest that there is indeed an increased carbohydrate storage in those animals treated with insulin. This point will be subjected to further investigation utilizing both histochemical and biochemical techniques.

10 Minutes

Amino Acids Found in *Tetrahymena pyriformis* (Variety 6, Mating Types I, II, and III) Using Paper Chromatography

CAROLYN WELLS, Department of Biology, Emory University
(Introduced by W. D. BURBANCK)

Protozoa were grown on a chemically defined medium for 36 hours. Separation from this medium was accomplished by repeated centrifugation and washing. Organisms were hydrolyzed in 6N HCl for 48 hours, evaporated to dryness, and the residue washed in 3 cc distilled water and evaporated four consecutive times. A fifth portion of distilled water was added. The clear supernatant constituted the sample. A single drop of the sample was allowed to spread 18 hours on filter paper in propyl alcohol-water (7:3) solvent. After being air dried, the pattern was allowed to spread at right angles to the initial direction of flow for 18 hours in butyl alcohol-acetic acid (250:63) solvent. The two-dimensionally spread samples were air dried and developed in 1% acetone–ninhydrin, air dried, and allowed to bake at 60° C for 10 minutes. Approximately six amino acids have been recognized. Further separation and identification of these is now in progress.

10 Minutes

Histochemical Demonstration of Sulfhydryl Groups in Plant Tissues With 4-Iodoacetamido-1-Naphthol

LORIN W. ROBERTS, Department of Biology, Agnes Scott College

A new sulfhydryl histochemical reagent has been developed which utilizes the affinity of iodacetamide for reduced sulfhydryl groups. Plant tissues were killed and fixed in trichloroacetic acid and sections were prepared by the paraffin method. The deparaffinized sections were incubated in a Michaelis barbital buffer containing the sulfhydryl reagent for approximately 1 hour at 50°C. The colorless disulfide product was coupled with tetrazotized diorthoanisidine to form a highly colored azo dye at the histological sites of protein-bound sulfhydryl groups. The histological procedure followed was a modification of the method employed by Barrnett and Seligman with 2,2'-dihydroxy 6,6'-dinaphthyl disulfide. Preliminary experiments have not indicated complete inhibition of the coupling by prior treatment of the sections with N-ethyl maleimide in low concentrations. The histochemical localization of protein-bound sulfhydryl groups, as exhibited by this reagent, in the early stages of germination of *Zea mays* L. embryos is discussed.

10 Minutes 2 x 2 Slides

Eliminating Experimental Variations in the Use of Oxidation-Reduction Indicators in Sectioned Plant Material

LORIN W. ROBERTS, Department of Biology, Agnes Scott College

Wide variations have been observed in the histochemical demonstration of enzyme systems by the use of oxidation-reduction indicators (e.g., tetrazolium derivatives and potassium tellurite) in sectioned plant material. These variations were probably due to: failure of enzyme systems due to lack of cell integrity, loss of substrate from ruptured cells, presence of oxygen inhibiting reduction, difference in the relative thickness of the sections, or a combination of these factors.

It has been observed that a stem or root segment (e.g., *Phaseolus vulgaris* L. or *Allium cepa* L. root segment, *zea mays* L. coleoptile segment, or *Acer* sp.

stem segment), if submerged in an aqueous solution of the redox indicator, will exhibit reduction of the indicator in a narrow band at both ends of the segment. Serial sections were prepared of the narrow band of tissues exhibiting reduction. Approaching the center of this band of reduction, tissue sections showed a maximum reduction of the indicator both in reducing intensity and in the total number of tissues exhibiting reduction. Serial sections taken toward the center of the segment exhibited progressively less reduction until finally no tissues were observed to reduce the indicator.

Since tissue reduction in this "area of maximum reduction" is nonvariable and is not subject to external influences, it is suggested that sections from this region be adopted as a standard for tissue reduction in stem and root material.

10 Minutes 2 x 2 Slides

The Effect of Maleic Hydrazide on the Uptake and Distribution of Phosphorus in Bean (*Phaseolus vulgaris* var. Black Valentine)

WILLIAM T. LAMMERS, Emory University
(Introduced by W. B. BAKER)

Plants of *Phaseolus vulgaris* var. Black Valentine were sprayed with different concentrations of maleic hydrazide at different age groups and the effects on the uptake and distribution of p^{32} were studied.

Plants treated with 1 percent maleic hydrazide evidenced positive, visual symptoms of a phosphorus deficiency in all age groups. The stunting effect of a foliar spray of 1 percent maleic hydrazide was not believed to be due to a reduction in the amount of physphorus absorbed or its gross distribution within the plant. However, autoradiograms of the apical meristems of plants treated with 1 percent maleic hydrazide were less intense than similar regions of check plants.

In most cases plants treated with 0.5 percent maleic hydrazide took up as much or more P^{32} than check plants. A higher percentage of P^{32} was located in the stems of treated plants than in their roots. Only in young (2 week) plants did 0.5 percent hydrazide have a slight inhibitory effect. It is possible that apical dominance is only partially destroyed and the combined activity of both the apical and lateral buds might cause the increase in P^{32} uptake by treated plants.

Growth of Wheat Seedlings in High Gravitational Fields

BETTY F. EDWARDS, Georgia State College

Growth of wheat seedlings under gravitional forces of from 10 to 500 x normal gravity responds in a compensatory manner. Early growth at lower forces shows over-compensation in the form of increase in growth rate over that of controls. As the erect mass of the plant increases, the work load becomes intolerable and compensation fails, resulting in a decrease in growth rate. In spite of failing to compensate completely, the work output involved in upward growth against gravity continues to increase until structural collapse occurs at about 500 x gravity.

10 Minutes 2 x 2 Slides

The Present Extent and Distribution of Hardwood Forest Types in the Piedmont

THOMAS C. NELSON, Southeastern Forest Experiment Station, U. S. Forest Service
(Introduced by W. A. CAMPBELL)

An examination of early literature concerning the species composition of the Georgia Piedmont forests prior to clearing and cultivation indicates that:
1. The forest composition ranged from virtually pure pine stands to pure hardwood stands including the range of mixtures.

2. A small acreage, perhaps 2 or 3 percent of the land area, was in "glades" or "flatwoods" with a black-jack oak stand.
3. Between 35 and 40 percent, the red lands, supported a forest composed of hardwoods with little or no pine.
4. Approximately 45 percent, the gray, sandy lands, had a pine-hardwood mixture, varying in composition such that stands approached either extreme.
5. Some granitic lands, mostly of the Elberton formation and occupying 15 percent of the land area, had predominantly a pine composition. It is concluded that something less than 15 percent of the land area was supporting pure or predominantly pine stands at the time of settlement.
6. The proportion of pine increased in the drier situations and decreased on the more moist situations within a specific land type. For all practical purposes, pine was not present on the bottoms.
7. The distribution of original forest types was not uniform throughout the Georgia Piedmont but, in general, the pine types and the stands with heavier portions of pine seemed more prevalent west of the Atlantic-Gulf divide than east of it. The percentage of pine types also seemed to decrease from the sandhills to the mountains.

10 Minutes

Baccharis Species as Poisonous Plants in Georgia

WILBUR H. DUNCAN, Department of Botany, University of Georgia

Recent toxicological studies of plants demonstrate that three species of *Baccharis* (*B. angustifolia Michx., B. glomeruliflora* Pers., B. *halimifolia* L.) occurring in Georgia are poisonous when eaten by animals. Results of feedings of these three species to experimental animals indicate that one or more glycosidal constituents with digataloid activity is present. The probability of poisoning of cattle in Georgia by these species is analyzed in respect to apparent concentration of poisonous constituents and distribution and abundance of each species. Characters for recognition of the three species are discussed.

10 Minutes 2 x 2 Slides

Rotary, Mosquito Trap Stand

WILLIAM C. BARGREN and CARLYLE NIBLEY, JR., Third Army Area Medical Laboratory

Field experiments were made at Fort Benning, Georgia, in 1955 on the attractiveness of different colored incandescent lamps to specific species of mosquitoes. A rotary, mosquito trap stand was constructed to facilitate the experiments. The stand operates four light traps in one place at the same time, equalizes effects of favored trap positions and controls the light intensity of the lamps. The present report concerns the mechanical features of the trap stand.

10 Minutes 2 x 2 Slides

Report From the Division of Biology and Agriculture of the National Research Council

H. M. PHILLIPS, Emory University

A summary of the activities of the Committee on Educational Policies of the Division of Biology and Agriculture is outlined. A brief report will also be included on the plans of the Committee on Education and Recruitment of the American Institute of Biological Sciences.

10 Minutes

SECTION BUSINESS MEETING

FRIDAY, APRIL 27, 1956, 2:30 P.M.
Wilby Room, Price Gilbert Library

Symposium: Water Conservation

ROBERT PLATT, Emory University,
Moderator

Water Tables in the United States are continuing to fall. Industrialization and population increases in Georgia have made water one of the most acute natural resource problems in the state. Current viewpoints will be presented by outstanding authorities on water resources and conservation.

DEMONSTRATION PAPERS

4:00 - 5:30 P.M.
ROOM 226, ENGINEERING RESEARCH BUILDING

The Isolation of Myxomycetes and Other Opsimorphs From the Soil

ARTHUR L. COHEN, Oglethorpe University

The term, "opsimorph" or "opsimorphic organism" was coined by the author to describe that assemblage of organisms in which morphogenesis follows, and is distinct from, growth in mass or number of cells. The Acrasieae, Myxomycetes, and Myxobacteria are the best known examples. Several media have been used for the isolation of these organisms, including Ashby's mannitol agar and the dung of various animals. The present demonstration is the result of a combination of mannitol agar and sterile rabbit dung pellets, which when inoculated with soil from forest, lawn, field, or garden show many different opsimorphs.

The medium is weak and relatively nonselective, hence not only do the opsimorphs appear, but a great variety of bacteria and moulds. The medium is recommended for class use as an excellent general medium for demonstrating the soil microflora.

The Podocarpaceae in New Guinea

NETTA E. GRAY, Department of Biology, Agnes Scott College

The Podocarpaceae is one of the seven families of conifers and is widely distributed around the world in the southern hemisphere. More than a dozen species in the two genera, *Dacrydium* and *Podocarpus*, are found in New Guinea. Some of the species have the scale-like leaves familiar in the conifers but others have broad leaves with a single mid-rib and one of them even has numerous parallel veins. The plants are evergreen, the leaves often remaining for many years, and they are dioecious. The pollen cones on the male plants appear like familiar catkins. The seeds are usually solitary, have a fleshy covering, and are often supported on fleshy receptacles sometimes colored orange or brilliant red. The fruits are eaten by birds and fruit-eating animals.

Inexpensive Kodachrome Slides for Classroom Use

E. E. JONES, Tift College

The biology instructor in the small college is frequently plagued with a limited budget which precludes the purchase of specialized photographic equipment and discourages the acquisition of commercial Kodachrome preparations. The photographic equipment demonstrated is suitable for either photomicrographs or close-up photographs of small specimens. The apparatus consists of a camera, camera support and an electric timer. The total cost for the construction of this equipment was less than fifteen dollars. Kodachrome slides

of protozoa, mammalian tissues and living marine animals are included in the demonstration.

A Simplified Drosophila Rearing Technique

JOSEPH J. PAUL, University of Georgia

Several of the Drosophila culture media commonly used are cumbersome in their preparation. In a simplified formula common household staples are used which are blended together in the following proportions: Powdered Sugar—1 part, Corn Starch—2 parts, Dry Active Yeast—2 parts. These may be mixed, stored, and used as required. The blend is mixed with water in the ratio of one-half teaspoon of dry mixture to four teaspoons of water. Absorbent cotton is saturated in the resulting wet mixture and placed in any convenient rearing chamber such as milk bottles. At least two generations of Drosophila can be reared from each culture set-up before the cotton need be discarded. A very convenient culture rearing chamber consists of a lantern chimney placed in an inverted position on a peanut butter jar. This is capped with the lid from a round ice cream carton. By inserting two glass plates between the lantern chimney and the jar, flies may be handled with ease.

An Integrating Light Meter for Photomicrography

ROBERT L. WALTERS and ARTHUR L. COHEN, Oglethorpe University

There are various commercially built integrating light meters available that are beyond the budget and needs of the biologist interested in photomicrography. By using a slightly modified standard circuit, and a 1P42 phototube, small enough to be used as a probe on the ground glass of a photo micrographic assembly, a comparatively simple, inexpensive, versatile and stable electronic light meter has been constructed for photomicrography and photo macrography.

The meter serves equally well to measure intensity of continuous illumination and to integrate the total light output of a flash tube.

SECTION II

CHEMISTRY

FRIDAY, APRIL 27, 1956, 9:00 A.M.
Room 255, Chemistry Annex
Chairman: W. H. BURROWS

The Toxicity of Chromium to a Mixture of Microscopic Organisms Under Aerobic Conditions

LINELLE T. HILLEY and ROBERT S. INGOLS, Georgia Institute of Technology

The mixture of microscopic organisms are similar to those found in the sewage treatment process and is normally called activated sludge.

Toxicity is measured as the effect on respiration, which is measured by carbon dioxide production.

We are studying the effect of various factors consisting of temperature, food, food concentrations, and the valence of chromium. Each of these factors causes a difference in the response of the microscopic organisms to the chromium. To date there has been no rational pattern presented. We have a feeling that there are not less than two factors involved: the defense of the organism and the variable attack of the chromium.

20 Minutes 3¼ x 4 Slides

The Evaluation of Chemicals as Aerial Disinfectants

T. W. KETHLEY, W. B. COWN and E. L. FINCHER, Georgia Institute of Technology

Equipment is described for the rapid evaluation of chemicals which are being studied as aerial disinfectants. In the course of these studies it has been found that compounds must be evaluated at both low and high relative humidities because of the radically different effectiveness of various classes of compounds under these two conditions. Results are given of the evaluation of a series of compounds as aerial disinfectants.

10 Minutes 3¼ x 4 Slides

Determination of Ozone

ROBERT S. INGOLS and ROBERT H. FETNER, Georgia Institute of Technology

It was realized that ozone is generally, extremely unstable in water solution. Thus, before any adequate technique could be developed for determining the ozone in solution, it was necessary to find a condition where it would be stable. It has been found to be stable at 1° C and pH 2.0 both by chemical analysis and by light absorption at 236 mu.

By using aliquots of the stable ozone solution, it has been possible to show that ozone can be determined with high precision by its reaction with the ferrous ion to the ferric ion at pH 2.0. The amount of iodine liberated from iodide at pH 2.0 indicates an amount of ozone approximately 2.5 times the amount of ozone indicated by the ferrous-ferric system. If the ozone solution at 1° C is first adjusted to pH 9.0 and iodide added, the iodine liberated indicates the same amount of ozone as the ferrous-ferric system. The addition of bromide at pH 2.0 indicates an amount of ozone comparable with the ferrous-ferric system. It is concluded that the byproduct oxygen liberates iodine from iodide at pH 2.0.

20 Minutes 3¼ x 4 Slides

The Effect of a Temperature Gradient on the Concentration of Solid Alloys

JAMES C. FANNING, JR., and WM. M. SPICER, Georgia Institute of Technology

Four alloys, Cu-Cr, Cu-Ni, Sn-Pb, and Zn-Al, were subjected to a treatment wherein one end of a rod of each alloy was maintained at a high temperature and the other end maintained at a low temperature. The hot end corresponded to a region of unsaturation and the cold end to the region of saturation, in the Cu-Cr, Sn-Pb, and Zn-Al systems. In the Cu-Ni system both ends corresponded to a solid solution region. No migration after many days was found in the case of the Cu-Ni alloy. There is evidence, however, in the case of the other three alloys that migration occurred, for after a long period of time the concentration of the solute component seemed to have been increased in the hot end.

20 Minutes

The Zero Oxidation State

ERVIN COLTON, Georgia Institute of Technology

Of all the oxidation states of the transition metals, one of the most interesting and unusual is the zero oxidation state. Inorganic coordination compounds have been prepared in which a transition metal, in a formal oxidation state of zero, is coordinated to any of a variety of donor groups to form a complex of unusual character.

Donor groups of recent interest include the following: CO (carbon monoxide), CN (cyanide ion), NH_3 (ammonia), RNC (organic nitriles), $P(OR)_3$ (Phosphite esters), NS (thionitrosyl group), and RC=CH (acetylides).

Some aspects of this relatively new area of theoretical and synthetic inorganic chemistry will be discussed.

20 Minutes 3¼ x 4 Slides

CHEMISTRY SECTION BUSINESS MEETINGS

2:30 P.M.

Chairman: WILLIAM H. EBERHARDT

SYMPOSIUM ON COLOR

1. The Characterization of Color
   Dr. Vernon Crawford, School of Physics,
   Georgia Institute of Technology ..... 45 Minutes
2. Light Absorption of Organic Molecules
   Dr. Leon Mandell, Department of Chemistry
   Emory University ..... 45 Minutes
3. Application of Color to Problems in Analysis
   Dr. J. K. Carlton, School of Chemistry
   Georgia Institute of Technology ..... 30 Minutes
4. Industrial Applications of Color
   Mr. Eugene P. Cofield,
   Scripto Manufacturing Company ..... 30 minutes
5. Experiential Aspects of Color
   Dr. M. Carr Payne, Department of Psychology
   Georgia Institute of Technology ..... 30 Minutes

SECTION III

EARTH SCIENCES

FRIDAY, 9:00 A.M.

209 CIVIL ENGINEERING BUILDING

Graded Bedding

JAMES WM. SMITH, Emory University

The subgraywacke beds which outcrop east of Fairmount, Georgia, were studied in hopes that top-bottom criteria could be found which would eliminate certain possible folds. This sequence is immediately east of the questionable Cartersville Fault, and it was therefore possible that the sequence might contain isoclinal folds or be a portion of an overturned fold.

Samples were collected where it was believed a thickness could be removed as a unit which had been deposited during one interval of time, possibly by a turbidity current. These samples were collected wherever possible along the entire thickness of the subgraywacke beds, and a few were collected along strike 2½ miles away.

It was concluded from graded beds that there are no isoclinal folds within the sequence and that the sequence is not overturned. A few of the beds show a continual gradation from top to bottom, but some show a reversal in grading for a fraction of the unit; however one can still distinguish top from bottom. No unit showing a reversal in grading over an entire unit was found.

10 Minutes 3¼ x 4 Slides, Opaque Projector

A Preliminary Investigation of Some Depositional Features Between St. Augustine and Fernandina Beach, Florida

JACK BLODGETT, Emory University

Samples of beach sand were collected from three locations along the east coast of Florida between St. Augustine and Fernandina Beach. These samples were analyzed for the purpose of determining their composition and grain size preceding a more detailed study. Tyler screens with openings corresponding to the Wentworth Grade Scale were used in the size analysis and a separatory funnel containing Bromoform with a specific gravity of 2.88 was used for the heavy mineral separations. The most abundant light mineral was quartz, while the heavy mineral suite consisted principally of Ilmenite, Monazite, Rutile, and Zircon. Most of the heavy minerals have a diameter of 1/16 mm. The unseparated samples are very well sorted (especially the aeolian dunes) and the grains have a diameter predominately of 1/8 mm.

15 Minutes Opaque Projector

The Halloka Creek Site, Fort Benning, Georgia

JOHN W. CHASE, University of Georgia

The author, a member of the military personnel at Fort Benning, Columbus, Georgia, has made a survey of archaeological sites in the neighborhood of the military reservation along the Chattahoochee River and its smaller drainage. Halloka Creek, within the confines of the military camp, disclosed a deeply stratified site, which gives a strong representation of transitional archaic and early pottery types in southwest Georgia.

Preliminary analysis of the materials indicates a cultural continuum of pre-pottery or Archaic flint at the deepest substratum level, integrading into a horizon which contains fibre-tempered pottery, followed by Swift Creek Complicated Stamped ware. The Swift Creek material is of particular interest in duplicating closely the general pottery morphology and design found by A. R. Kelly at the type site of Early Swift Creek on the Ocmulgee, Macon,

Georgia. Early Swift Creek sites are rare in Georgia and the immediate Southeast, and the finding and preliminary test pitting of the Halloka Site reveals not only a strong showing of this material, but also provides stratigraphic context with earlier fibre-tempered and pre-pottery assemblages.

Paleozoic Carbonate Rocks at Fairmount, Georgia

ALFRED W. STUART, Emory University

The carbonate rocks discussed in this paper are found in a north-trending valley in which the town of Fairmount, Gordon County, Georgia, is located. These carbonates have been committed to both the Rome and Conasauga formations, both Middle Cambrian in age, by other workers. Precise determination of the geologic age is made difficult by the paucity of fossils.

The carbonates consist of a dark gray matrix of impure calcite, partially dolomitized, containing interbeds of dolomite seldom more than a centimeter in thickness.

The dolomite interbeds are though to be the result of penecontemporaneous replacement of calcium carbonate by dolomite and suggest deposition in a shallow, interior sea.

15 Minutes 2 x 2 Slides

The Rinconadas of Central Chile

GENE ELLIS MARTIN, University of Georgia

The purpose of this paper is to describe the form and occurence of *rinconadas* in central Chile. Rinconadas are large amphitheatre-like landforms. They have diameters from one-half to three miles and flat floors of alluvium. The semicircular mountain walls which rise for 500 to 3000 feet above the alluvial centers have very steep slopes.

Rinconadas occur along the western margin of the great structural longitudinal valley of central Chile and along the structural valleys through which the Aconcagua and its tributary rivers flow. Faulting has been advanced as the basic cause for the rather unique shape of these landforms.

A Grain Size Analysis of the Red Mountain Formation in Maddox Gap

LEE SAYLES TRUXES, Emory University

The Silurian Red Mountain Formation in Georgia consists of two distinct recognizable periods of deposition. The coarse-grained sandstones of the lower portion of the formation are of Medinan age. The alternating fine-grained sandstones and slits of the upper portion are of Niagaran age.

Slides were made of these two sections of the Silurian Red Mountain Formation and a grain size analysis performed. The grain size analysis was computed by the use of a seoscope, which projects and enlarges the slides. From this projection, the size of the grains were measured. From the graphs made of these projections, one can visualize the sorting and other phenomena.

10 Minutes

Stains for Differentiating Calcite and Dolomite

H. S. HANSON, Emory University

Calcite-dolomite breccia and calcite-dolomite "zebra" rock of the Knox formation have been stained using the methods of Heeger, Henbert, Lemberg, and Mahler, and a comparison made as to ease of operation and definition.

10 Minutes 2 x 2 Slides

A Grain Size Study of Some Eocene Beds

JAMES W. ERWIN, Emory University

The technique of grain size analysis has been applied to several different zones of the Eocene formation in Randolph County, Georgia. Samples were taken from two different outcrops approximately six miles apart, along the strike of the formation. An attempt will be made to correlate between the two outcrops and to show the facies change that takes place along the strike of the beds.

15 Minutes Opaque Projector

Analysis of Ordovician Red Bed Sediments in N. W. Georgia

C. HARRIS ARMSTRONG, JR., Emory University

Samples for this report were taken from the Zone 4 Red beds of Ordovician Age found at Mill Creek, Georgia, about four miles north of Dalton on Highway 41. Here the lithology consists of red siltstones, sandstones, and sedimentary quartzites interbedded with thin red shales.

The methods of analysis used were the accepted methods of grain size determination. For the more friable sandstone, the samples were first disaggregated and sorted with Tyler screens set up to the Wentworth scale. Thin sections were made of the more indurated sandstone and sedimentary quartzite, and grain size was determined microscopically. Separation of the heavy minerals from the samples was accomplished by the use of Bromoform (S. G. 2.84), and the various heavy minerals were identified.

15 Minutes Opaque Projector

Transitional Archaic and Early Pottery Sites in the Ogeechee Drainage

A. R. KELLY and JOHN H. CAIN, University of Georgia

Recent archeological survey in the area between the Ogeechee and Oconee rivers, centering around Louisville, Georgia, and study of large private collections, have thrown new light on the prehistory of this mid-coastal sector, and indicate the extension into northeastern Georgia of early prehistoric cultures once considered to cluster on the South Atlantic coast.

Collections made by John H. Cain, studied in the Laboratory of Archeology at the University of Georgia, show that fibre-tempered pottery related to that found at Stalling's Island, on the Savannah river below Augusta, occurs widely on the upper Ogeechee. A large Simple-Stamped pottery site has been reconnoitered at Ball's Ferry on the Oconee. The Ogeechee fibre-tempered sites near Louisville help to define an ancient frontier between the early groups associated with Stalling's Island culture in shell heaps, and a strong thrust of fabric-marked pottery groups along a broad front in north, northeast, and north central Georgia.

In the pre-pottery sites of the Ogeechee group there is exhibited a typical late Archaic culture, assimilated to the type site at Stalling's Island, with a sub-areal specialized flint culture represented by extensive quarries of a distinctive local chert, with workshops and campsites, known as the Briar Creek Flint culture.

Carbon 14 dates assign to the early fibre-tempered pottery a date circa 3600 years B.P. The Stalling's Island pre-pottery must be somewhat earlier, 4000 years or more before the present.

15 Minutes

A Petrographic Study of Some Silurian and Mississippian Sediments Southeast of Ringgold, Georgia

JAMES E. CALLAHAN, Emory University

The sediments described in this paper were sampled in an east-west traverse east of Taylor Ridge in a thick sequence of Silurian and Mississippian shales, sandstones, and siltstones in an effort to establish an arbitrary contact between these two periods. In the absence of the Chattanooga Black Shale, which does not outcrop in the area, and of sufficient well-preserved diagnostic fossils, it was found necesary to base such a contact on a petrographic study of the coarser sediments. Since most of the rocks are highly indurated and quartzitic, thin section methods of analysis were employed.

10 Minutes 2 x 2 Slides

Preferred Orientation of Pebbles in a Sedimentary Deposit

GEORGE GRUMBLES, Emory University

Pebbles from a stream placer, ½ mile southwest of Canton, Georgia, on State Highway number 5, and 1/3 mile north of the now existent channel of the Etowah River, are found to have a preferred orientation.

The methods that have been employed for the collection and graphic representation have been described. The graphic illustrations are: petrofabric diagram using an equiareal net, histograms based on azmuth and dip frequencies, and a vector diagram.

It is concluded that these graphs can be used to advantage when depicting preferred orientation in a detailed study of gravel sized clastic sediments.

15 Minutes 2 x 2 Sdiles

SECTION IV

PHYSICS, MATHEMATICS, AND ENGINEERING

FRIDAY, APRIL 27, 10:00 A.M. TO 12:00 M.

Room 107 Physics Building

Round Table Discussion on Education

This will be a round table discussion of the problems facing us in education at the college level. It will include the encouragement of students in Science and Mathematics in High School, and the preparation of college students for Graduate School. There will be an intermission for lunch. While no formal arrangements will be made it is expected that the group will be able to find tables in the College Dining Hall where they can eat together and order their lunches according to individual preference.

11:30 — SECTION BUSINESS MEETING

FRIDAY, APRIL 27, 2:30 P.M.

Room 105 Physics Building

Radiation From Atomic Metastable Levels of Oxygen

C. DEWEY COOPER, University of Georgia and Harvard University

The $^1S_0 \rightarrow {}^1D_2$ and $^1D_2 \rightarrow {}^3P_{1,2}$ transitions which give rise to the 5577A green and the 6300, 6364A red lines are forbidden by dipole radiation selection rules. Laboratory production of these lines is generally difficult even though they occur as very intense lines in the aurorae. A rare gas oxygen mixture is often used to prolong the lifetime of these metastable levels and thereby increase the number of radiation transitions. In addition, we can ask if the presence of the rare gases increases the radiation intensity by collision induced emission or by the formation of molecular complexes. In an effort to answer the above questions, several experiments were designed which utilized different excitation methods as well as rare gas pressures from 1 mm of Hg to 7 atmospheres. The experimental results will be discussed.

15 Minutes 3¼ x 4 Slides

The Role of Electronics Engineering in the Medical Sciences

WILLIAM B. MILLER, JR., Emory University

A brief discussion of the growing need for electronics engineering assistance in the medical sciences; and how this assistance aids the investigator in his quest for knowledge.

A Kundt's Tube Demonstration for the Lecture Room

WILLIAM T. LANIER and WILLIAM C. SIMPSON, Physics Department, Georgia Institute of Technology

A calibrated, variable-frequency audio-oscillator is used to drive an earphone which serves as the vibrating source in a Kundt's tube. This enables one to determine absolute, rather than relative, values for the velocity of sound in gases without the necessity of first determining the elastic constants for a vibrating rod.

The nodes and anti-nodes of a standing wave are located in the usual manner by use of fine cork dust. The dust remains undisturbed on the bottom of the tube in the vicinity of a node, and gathers into striations, or ridges, in

the region of an anti-node. The resulting pattern is discussed briefly and may be projected onto a screen for viewing by an audience. A small rubber-bulb is used to reduce the gas pressure inside the tube and thus visually demonstrate the fact that sound is not propagated in vacuum.

The necessary apparatus can be found in most laboratories and assembly is quite simple. The equipment can serve a dual purpose by being placed in service in the undergraduate laboratory for experiments such as the determination of the ratio of heat capacities at constant pressure to constant volume for different gases.

Some details of the physical construction are described and the apparatus will be shown and demonstrated.

15 Minutes

The Action of Liquid Impinger Air Samplers

W. B. COWN, E. L. FINCHER, and T. W. KETHEY, Engineering Experiment Station, Georgia Institute of Technology

A motion picture is shown of high-speed photographs taken of the stream of air issuing from a critical orifice liquid impinger used in the sampling of air for bacteria. The stream of air is presumed to pass through the orifice at acoustic speed, and upon striking the liquid, to form an oscillating jet which either forms relatively large bubbles or brakes up into many small ones. The mechanism by which airborne particles are removed from the airstream is presumed to be a combination of inertial settling and scrubbing.

10 Minutes Motion Picture

Meteor-Scatter Research at Georgia Tech

M. L. MEEKS, Engineering Experiment Station and School of Physics, Georgia Institute of Technology

The ionized trails left by meteors as they enter the upper atmosphere are capable of reflecting radio waves. The Engineering Experiment Station in cooperation with the University of Tennessee is engaged in a study of these meteor-scatter signals produced over a path from Knoxville to Atlanta. The transmitter and receiver use directional beam antennas with a beam width of 20° to half-power. The operating frequency is 41.94 mc/sec. A program has been devised for studying the reflections from various portions of the sky as a function of local time and season. Calculations have been made to predict the meteor signal rate as a function of the region in the upper atmosphere which is illuminated.

15 Minutes 3¼ x 4 Slides

E. T. PATRONIS, JR., C. H. BRADEN, and L. D. WYLY, Georgia Institute of Technology

In our program of measurements of K and L shell fluorescence yields we have obtained values of W_K for nickel, copper, and zinc by the direct method. The materials under examination are excited by the x-rays from radioactive Cd^{109} and the fluorescence quanta emitted by the materials are detected by a gas proportional counter. The values obtained are W_K for nickel $= 0.33 \pm 0.02$, W_K for copper $= 0.39 \pm 0.02$, and W_K for zinc $= 0.44 \pm 0.02$, and are in good agreement with previous measurements employing different techniques.

V. W. SHIEL, L. D. WYLY, and C. H. BRADEN, Georgia Institute of Technology

The directional correlations of three gamma ray cascades in Pt^{192} following the beta decay of Ir^{192} have been measured. The (468) (316) kev gamma cascade gives $A_2 = 0.088 \pm 0.006$ and $A_4 = 0 \pm 0.01$. These values agree with those previously reported. The (604) (316) kev gamma cascade gives

$A_2 = -0.21 \pm 0.01$ and $A_4 = 0 \pm 0.02$. The (612) (589) kev gamma cascade gives an anisotrophy ratio of 0 ± 0.04. Assuming pure E2 radiation and a spin of 2 for the first excited state of Pt^{192}, the (604) (316) kev directional correlation indicates a spin of 3 should be assigned to the excited state at 921 kev.

Determination of Molecular Weights With Ultracentrifuge

WILLIAM C. SIMPSON, Georgia Institute of Technology and University of Virginia

For several years, work has been in progress toward the development of an electromagnetically supported ultracentrifuge which can be applied to the problem of molecular weight determination by the sedimentation equilibrium method. This method is especially useful in the region of low molecular weights (200-5000 molecular weight units).

A dilute solution of the sample being studied is placed in a cell contained in the rotor. After operating speed has been reached, the rotor is allowed to coast until the rate of sedimentation and the rate of diffusion of molecules balance each other, thus establishing a condition of equilibrium.

Measurements of concentration distribution are made by photographing an interference fringe pattern, and the molecular weight calculated from the data thus obtained.

15 Minutes Slides

Osmotic Pressure of Polystyrene in Benzene as Measured in a Metal Membrane Osmometer

A. L. FRENCH and T. A. BARR, Department of Physics, University of Georgia

A study of porus silver 'membranes' has shown that they may be used as semipermeable osmometer membranes for certain materials. For other materials diffusion of the solute through the membrane has effectively reduced the observed value of osmotic pressure. Jenkins measured values of osmotic pressure for a series of polystyrenes in methyl ethyl ketone. At the present, experiments of the same type are being carried out on polystyrene in benzene to determine the influence of the solvent on measured values of osmotic pressure and solute diffusion. A comparison will be made of the osmotic pressures as measured in methyl ethyl ketone and benzene.

15 Minutes 3¼ x 4 Slides

SECTION V

PSYCHOLOGY AND MEDICINE

FRIDAY, APRIL 27, 1956, 9:00 A.M.

Room 156 Chemistry Annex

Chairman: STEPHEN W. GRAY

EVANGELINE T. PAPAGEORGE, Presiding

The Validation of a Test Battery for Use in the Selection of Technical Specialists in a Beverage Industry

JAMES E. GREENE, SR., University of Georgia

PROBLEM: The present problem was that of devising and validating a test battery for use in the selection of chemists and engineers in a soft drink industry. More specifically and operationally, the problem consisted of determining which specific total and sub-test scores could be used to discriminate significantly between company employees who had demonstrated relatively high levels of on-the-job performance as chemists and engineers *versus* least satisfactory such employees.

PROCEDURES: Detailed job analyses were made of each of the two jobs. Inferences were made concerning the psychological attributes required by each job. A "preliminary" test battery was devised in relationship to the inferred psychological attributes. This test battery was administerd to all currently employed chemists and engineers. Measures of relationship were computed between scores and sub-scores of the test battery and measures of on-the-job efficiency of the validation population. By means of the over-lapping curve procedure, "cut-point" scores were determined for the five test categories yielding relatively high discrimination between "most satisfactory" and "least satisfactory" employees.

FINDINGS: The "cut-point" scores as emirically derived were applied to the "best" and "poorest" portion of the validation group. It was found that 100 per cent of the "best" group earned two or more "favorable" scores on the test battery whereas 81.3 per cent of the "poorest" group failed to earn as many as two "favorable" scores. Certain implications of the study will be discussed briefly.

The Effect of Failure in Problem Solving on Reaction Time to a Word Association Test

GLORIA CALHOUN and MIRIAM CALE, Agnes Scott College

(Introduced by KATHERINE T. OMWAKE)

This experiment was designed to test the hypothesis that in a word association test, the reaction time to the critical words will be longer than the reaction time to the neutral words for subjects who are ego-involved because of failure in problem solving. Three groups of ten college freshmen and sophomores were tested individually with a word association test consisting of 75 words. The control group was given only the word association test. One of the experimental groups was given an easy problem with the Yerkes multiple-choice apparatus and made to feel highly successful and intelligent. They were then given the word-association test. The other experimental group was given a problem to which there was no solution. They were told that the ability to solve the problem was a test of their intelligence and were subjected to belittling remarks concerning their inability to solve the problem. After this frustrating experience, they were given the word association test. Twenty-five words, chosen because of their connection with failure in the multiple-

choice problem solving situation, had been interspersed among 50 neutral words to make up the word association test. It was thought that if sufficiently ego-involved, the frustrated subjects would feel a sense of failure and therefore would respond more slowly to the critical words on the word association test than to the neutral words. The subjects who had no reason to feel a sense of failure would respond to the critical words in approximately the same time as to the neutral words.

The mean reaction time of the frustrated subjects to the critical words was 4.45 seconds as compared with a mean response time of 1.22 seconds to the neutral words. The mean difference of 3.23 seconds is significant far beyond the 1% level of confidence. The response time of the two non-frustrated groups to the critical words was not significantly different from that to the neutral words nor from the response of the frustrated subjects to the neutral words.

The Effects of Frustration on the Learning of Nonsense Syllables

MARY EVANS BRISTOW and SALLY TEMPLEMAN, Agnes Scott College

(Introduced by Katherine T. Omwake)

The purpose of this experiment is to determine whether frustration affects learning. The hypothesis is that frustration caused by artifically produced failure results in a reduction in the number of nonsense syllables learned. The experimental and control groups, each consisting of eight Agnes Scott freshmen, were individually given six trials to learn a list of sixteen nonsense syllables, half learning list A and half, list B. After six learning trials, each followed by a written recall, frustration was produced in the experimental group by presenting each subject with a deck of two-sided cards and requesting that she arrange them into four suits. The cards had been made by pasting parts of three decks back to back with ten cards represented once, ten cards three times, and thirty-two twice. Each subject was told that this was a test of her mental ability and derogatory remarks were made concerning her failure. In the ten minutes allowed, it was impossible to complete this task. After frustration, the subjects learned the second list. The control group learned a list of nonsense syllables, followed by a ten-minute relaxation period, after which they learned the second list.

Although both groups had been equally successful in learning the first list of nonsense syllables, the number learned by the experimental group after frustration was smaller than the number learned by the control group following relaxation. This difference was significant at the 5% level of confidence.

A Study of the Homogentisic Oxidase of Liver

W. KNOWLTON HALL, V. P. SYDENSTRICKER and LUCIA O. MOODY,
Departments of Biochemistry and Medicine, Medical College of Georgia

Attempts were made to purify the crude homogentisic acid oxidase from a rat liver homogenate which had been centrifuged at 100,000 G. After precipitation with 23% acetone in the cold, the redissolved precipitate had an activity half that of the crude preparation. Electrophoresis through a starch block resulted in no significant concentration of activity. Fractionation through a cellulose column gave a fraction with double the original activity. Application of the ethyl alcohol-ammonium sulfate fractionation technique of Ravdin and Crandall gave a fourfold increase in activity. The most potent concentrate was obtained by fractionation of the crude liver homogenate in a Dowex 1 column. One fraction had eight times the original potency.

Studies made of partially purified preparations showed that dialysis or metal binding inhibitors reduced the activity of the preparations, an effect which was reversed by adding ferrous iron and vitamin C. Although from the work of Demole, it would be expected that large amounts of vitamin C would inhibit the oxidation of homogentisate, this was not found to be the case.

Livers from vitamin C deficient guinea pigs contained normal amounts of homogentisate oxidase. The liver from one human alkaptonuric was shown to lack the enzyme.

The Effects of Age and Hydrocortisone on the Diffusion of Blood Constituents Into the Wall of the Rat Aorta

FRANK LABELLA, Department of Anatomy, Emory University
(Introduced by A. I. LANSING)

Associated with elastin, the scleroprotein prepared by refluxing the rat aorta in alcohol, acetone, and tenth normal sodium hydroxide, are two phosphorus fractions which increase linearly with increasing age of the rat and which parallel one another. Radioactive phosphorous (p^{32}), administered as inorganic phosphate, shows that labelling of both acid-soluble and acid-insoluble phosphorous (indicated as counts per minute per mole phosphorous) also increases with age. This is interpreted as demonstrating a progressive change in the structure of the aorta with age by which the blood constituents are permitted greater access to the medial layer of the aortic wall. This age effect is very obvious even in groups of rats differing in age by one month.

In this regard, also, cortisone has been said to affect the ground substance of connective tissue so as to enhance the diffusion of substances through the tissue. To test this hypothesis, growing rats were given daily 2.5 milligrams of hydrocortisone (Merck), intraperitoneally, for several weeks; p^{32} was administered one hour before the rats were sacrificed. The aortic walls of the cortisone-treated animals showed a higher degree of labelling of all phosphorous fractions. As a further indication that the blood constituents pass more readily into the media of animals treated with cortisone, is the presence of four to five times as much fat-soluble material in the arterial walls of the experimental animals.

Dynamics of Blood Flow in Hearts With Interatrial Septal Defects

JOE C. STUBBS, Department of Anatomy, Emory University
(Introduced by STEPHEN W. GRAY)

Congenital heart defects, because of their multiplicity of character and position, present some of the most complex problems in medicine. This paper deals with interatrial defects which constitute 20% of all congenital abnormalties of the heart.

Variations and alterations relative to interatrial blood volume (pumping load), blood pressure and oxygen content are the major sources of concern in the interatrial septal defect.

Isolated interatrial defects will be considered on the basis of: (1) direction of blood flow through the abnormal shunt, (2) relation of atrial pressures to the direction of this flow, and (3) effect flow through this shunt has on systemic oxygen saturation.

Effects of Narcosis and Hypothermia Upon Resistance to Asphyxia in Newborn Guinea Pigs

FAITH S. MILLER and JAMES A. MILLER, Department of Anatomy, Emory University

Earlier experiments have demonstrated that hypothermia is effective in protecting newborn guinea pigs from asphyxia (Miller and Miller, 1954). Since narcosis reduces motor activity, blocks shivering, reduces muscle tone, particularly at low temperatures, and depresses basal metabolism, experiments were performed to test the effects of narcosis upon asphyxial resistance at

body temperatures between 40°C and 14°C. Two mg./c.c./ 100 gm. nembutal (sodium pentobarbital) in water was injected intraperitoneally into day-old or younger guinea pigs. Littermate controls received water only. Temperatures were adjusted by radiant heat or immersion to the neck in ice water. Asphyxia was produced by exposure in a bell jar to 95% N_2 + 5% CO_2.

Pentobarbital narcosis prolongs asphyxial survival at all temperatures tested, but is most effective at temperatures below 20°C. Survival times are the same whether animals are narcotized before or after cooling. Littermates tested with chlorpromazine, nembutal, or a combination of the two indicate that chlorpromazine is less effective in prolonging asphyxial survival and that it does not potentiate the beneficial effects of nembutal. Narcotized animals can recover completely from exposures which are lethal to non-narcotized littermates at the same temperature. With cooling superimposed upon narcosis most animals recover from two times the lethal exposure. Oxygen uptake of normothermic and hypothermic animals is reduced by narcosis, but in the latter case the reduction is not as great as might be expected from the increase in survival time.

Motion Picture.

Medicine and the Phoenix

ALOYSIUS I. MILLER, Department of Anatomy, Emory University
(Introduced by Marion Hines)

The greater Atlanta area figures prominently in the emergence of a "New South" following World War II. Industrial relocation and expansion about the Atlanta area has triggered growth of a sociologic and economic nature. The new growth has left in its wake and continues to create problems of development reaching into almost every phase of human endeavor. This presentation is a critical analysis of these developmental problems with some suggestions for their solution, particularly in the area of the medical arts and sciences.

Is the Tubercle Bacillus Lysogenic?

W. B. REDMOND, VA Hospital, Atlanta

Rapid growth of the H37Rv strain in semi-synthetic liquid medium containing 15 ug/ml NH_4Cl as sole nitrogen source is followed by equally rapid lysis. Spontaneous lysis does not occur in medium containing 1000 ug/ml NH_4Cl. Agents known to induce phage production and lysis in lysogenic bacteria cause the T.B. to lyse with 1000 ug/ml NH_4Cl. Streptomycin, glucose starvation, anaerobiosis and heating to 56° C. for 30 minutes prevent the development of the lytic condition but have no effect on lysis once it has been initiated.

Avirulent, atypical and saprophytic mycobacteria lyse little or none in the nitrogen deficient medium with the exception of 2 BCG strains. These non-lysing strains are not affected by the inducing agents.

Attempts are being made to find an indicator strain that may be susceptible to a symbiotic phage. A few of the atypical strains have shown indication of lysis.

Attempts to demonstrate increased activity of protrolytic or lipolytic enzymes in the lysing cultures have failed.

Chemical analyses of bacilli grown in 15 ug/ml NH_4Cl have shown that the bacterial nitrogen is reduced to approximately 50% of the normal amount. The reduction is effected just prior to the beginning of lysis.

10 Minutes. 3¼ x 4 slides.

Section Business Meeting.

FRIDAY, APRIL 27, 1956, 2:30 P.M.

Room 156 Chemistry Annex

Symposium on Problems of Growth

CHAIRMAN STEPHEN W. GRAY, Presiding

Introduction

STEPHEN W. GRAY, Ph.D., Department of Anatomy, Emory University

In comparison with many physiological processes, the study of growth has begun rather recently. The earliest curve of human growth appeared in 1777 and the first book devoted to the subject, that of Qetelet, appeared in 1835. Much of the delay was due to the slow development of statistical methods for handling large numbers of measurements. Early height and weight charts based upon simple averages blossomed forth on penny scales throughout drug and variety stores. Little consideration was taken of genetic differences or constitutional types and countless thousands dieted and exercised to approach their arbitrary "normal" figures. Our descriptions and evaluations of growth are now considerably more sophisticated and, as a result, far less rigid.

Gowth description is not the only aspect of the study. We are interested in the actual processes involved. Understanding, prediction and control are our aims. Abnormalties of growth, such as will be discussed by others in this Symposium, need explanation which will lead to prevention or therapy. Nor can we limit ourselves to physical growth. Psychic growth must also be considered. Here, we are not as far beyond the descriptive stage.

Lastly, there are problems of cell and tissue growth which are not directly involved in this Symosium, but which underlie most of the changes taking place in the body. In this field too, are the problems of wound healing and of neoplastic growth.

Psychic Growth and Development

RICHARD E. FELDER, M.D., Atlanta Psychiatric Institute

This presentation proposes to begin with psychiatric concepts of psychosexual development and of emotional growth. Thereafter, an attempt will be made to reintegrate psychological learnings with the growth of the organism as a unit. Pertinent observations of other writers on the subject will be introduced.

Psychosexual development will be outlined in classical form. Emotional growth will be discussed primarily in terms of its timelessness, that is, of its association and dissociation with physical growth.

Allusion will be made to the problems brought about by the necessity of isolating artificially various fields of study, for purposes of scientific investigation, and the challenge faced by comprehensive medicine in attempting to reintegrate scientific data in terms of the individual.

Hormonal Factors in Growth

JANE A. RUSSELL, Ph.D., Assoc. Prof. of Biochemistry, Emory University

The harmones which are known to control general body growth will be reviewed briefly. Some recent investigations on the mechanisms of action of the hormones will be presented, and comparisons made among the hormones as to the nature of their physiological roles in normal and abnormal growth.

Mongolism and Cretinism

DIXON FOWLER, M.D., Emory University School of Medicine

Mongolism is a non-inherited mental deficiency disease of which the etiology is unknown. The incidence of mongolism is about 3.4 mongoloid children per 1000 live births.

It is known that in some manner the age of the mother might have some bearing on the cause, the older mothers having a higher incidence of mongoloid products.

There is frequent concurrence of other congenital anomalies with mongolism which suggests that whatever it is that transpires to cause the disease occurs during the sixth to eighth week of pregnancy.

In diagnosis there is a characteristic facies with slanting eyes which gives it the name of mongolism. The extremities, hands and feet are short and stubby. The skull is smaller than normal and flattened anteroposterior. There is a relaxation of muscles and tendons. The secondary sex characteristics are delayed and the individuals are non fertile.

There is retardation of mental development.

No specific therapy is known.

The great challenge is what is the cause of mongolism.

Cretinism is a congenital defect of the thyroid gland, with decreased production of the hormone.

It becomes evident usually at the age of two to three months.

The eyelids are puffy, the tongue is large, the skin is dry, the hair is dry and coarse. The muscle tone is good. There is delay in formation of the ossification centers. The serum iodine is decreased, blood cholesterol is usually increased, and the radio-active iodine uptake of the thyroid gland is decreased.

After the condition is diagnosed therapy is readily available in the use of thyroid gland extract.

The clinical picture is often confused with that of mongolism, and many of these children are more or less retarded mentally.

Dwarfism in Man

J. H. KITE, M.D., Scottish Rite Hospital for Crippled Children

The term "dwarfism" in a broad sense includes all conditions characterized by stunted growth. The term therefore requires some qualification. The term "nanism" is used to imply conditions in which there is impairment of growth only. The term "infantilism" applies to individuals in whom there is impairment of growth, sex and intellect. Dwarfing may be proportionate as the Pigmy in Africa, or disproportionate as the cases to be described. There are more than a dozen conditions which may cause dwarfing.

In the animal world we also see dwarfing. The dachshund has a normal length spine, but very short legs, like the achondroplastic. The bulldog has a short deformed spine and head but normal legs, similar to the chondro-osteodystropy cases of Morquio.

Achondroplasia is the commonest type of dwarfism and perhaps the most ancient. The reduction in height is due chiefly to the shortness of the legs. The long bones are short. The fingers may not reach below the trochanters. The head is suggestive of hydrocephalus. The legs are often bowed.

Morquio described a type of dwarfism as a "Form of Osseous Dystrophy," and Brailsford described the same type as "chondro-osteo-dystrophy." The deformity is seldom noticed before the age of four. The child fails to gain in height. The neck is short and the back rounded. The child stands in a crouching position with the hips and knees flexed. There is knock-knee deformity and a waddling gait.

Gargoylism or Hurler's syndrome is characterized by heavy, ugly facies, corneal opacity, mental deficiency, kyphosis, distension of the abdomen, and enlargement of the liver and spleen.

Ollier's disease is a unilateral form of dwarfism. It involves chiefly the long bones, and is more often in the end of the long bones which are growing the most rapidly.

These four types of dwarfs will be illustrated by slides.

20 Minutes. 2 x 2 slides.

SECTION VII

SCIENCE EDUCATION

SATURDAY MORNING, APRIL 28, 9:00 A.M.

Wilby Room, Price Gilbert Library

Chairman, HELENE NORWOOD LAMMERS

The Obligation of the College Teacher to the Secondary School Science Program

Ashton C. Varnadoe, Savannah. 15 Minutes.

The Universities dilemma in training secondary school science teachers.

Robert S. Ingols, Georgia Institute of Technology. 20 Minutes.

The importance of scientific terms in furthering a student's interest in a professional career in medical fields.

Mrs. Barbara McLellan, Emory University Hospital. 15 Minutes.

Geology and Earth Science Projects

Romeo J. Martin, Emory University. 20 Minutes.

A demonstration of a rapid radioactive decay, or a short Half-life and a merry one.

William H. Jones, Emory University. 20 Minutes.

The use of the Project Method to stimulate interest in science

T. W. Kethley, Georgia Institute Technology. 15 Minutes.

Five minutes recess.

THIS IS HOW I DO IT

Interpretation of microscopic tissues and simple methods of demonstration the learning process for use in human biology.

Paul L. Guptill, North Fulton High School. 10 Minutes.

The use of Georgia minerals in the class room.

Cora Lee Cheatham, Jordan Vocational High School, Columbus. 10 Minutes.

Demonstrations in light refraction and reflection. The use of pH indicators in organic solutions.

James A. Wash, Sylvan Hills High School. 10 Minutes.

(a) Establishment of Science camps in our section.
(b) Early Naturalist explorers of the Southeast.

Malvina Trussell, Florida State College, Tallahassee, Fla. 30 Minutes.

The How, When and Where of selling science.

Woolford B. Baker, Emory University. 20 Minutes.

How we teach Bird Conservation at Darlington as shown by the TRIAL BY JURY OF OTIS ASIO original slide pictures.

Mrs. Emily B. Walker, Darlington School, Rome. 20 Minutes.

Section business meeting.

The Universities Dilemma in Training Secondary School Science Teachers

ROBERT S. INGOLS, Georgia Institute of Technology

In the effort to improve the training of teachers at the secondary and primary school levels, salary incentives for continuing teacher education have been established. When the teacher with a bachelor's degree returns to the university for graduate study, what science courses can be fitted into their schedules? Courses below the senior level are generally not acceptable for graduate credit while senior and graduate courses have many prerequisites and are not germane. If the school of education wants to teach these courses, then how can they attract the scientist with an acceptable training for a professorial position?

Nevertheless, the science teacher must have exact information about the field to be taught in the language of the field. Thus, the term "Molar" weight, does not describe a tooth but 32 grams of oxygen. One cannot think in terms of chemistry unless he has worked in chemistry and has gained the tools of a chemist.

A Demonstration of Rapid Radioactive Decay

WILLIAM H. JONES, Emory University

Demonstrating the dwindling of the radioactivity of a sample is usually done with materials having half-lives of a few days, with the experiment extending over a period of perhaps two weeks. To complete the experiment within a single class period, half-lives less than ten minutes would be needed. Since shipping is here out of the question, such material is usually the radioactive daughter of a long-lived parent, with chemical separation at the last moment.

Half-lives less than ten seconds would be even more effective as a demonstration, allowing the class to observe, in a brief interval of sustained attention, the dying out of the activity of the sample. Though the time limitation seems insurmountable, recent developments have made such a demonstration possible in certain cases. The example to be shown uses ion-exchange methods to separate lead-207m, then makes audible by amplifier its subsequent decay; the half-line is eight-tenths second.

3¼ x 4 slides.

The Use of the Project Method to Stimulate Interest in Science

T. W. KETHLEY, Engineering Experiment Station,
Georgia Institute of Technology

A case is presented for the advantages of the required extra-curricular project for science classes at all levels in elementary and high schools. Based on personal observations, the advantages of this method are seen to be: (1) the amount of general and specific interest aroused in science; (2) the quantity of information that can be transmitted; (3) the variety of expression obtained; (4) the eventual lessening of the burden on science teachers; (5) encouraging greater participation by the students without discouraging nonprize winners; (6) supplying the external stimulus needed by even the interested student; (7) presenting an opportunity for the gifted student to express interest in science in a framework of normal and accepted activity.

15 Minutes.

The How, When and Where of Selling Science

WOOLFORD B. BAKER, Emory University

Teachers are essentially salesmen. As such they must know their product, know techniques for intelligently selling it and be able to justify its usefulness for those to whom it is sold.

It is particularly necessary to sell science as such instead of the products which result from science. Although our daily lives are governed and conditioned by the products of science our people as a whole are scientifically illiterate. This places an unusual responsibility on all who are charged with science teaching.

A discussion of the meaning of true science is in order, together with its implications for the present and future as well as some methods by which it can be presented most effectively.

20 Minutes.

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